11/19/09 CDPHE drinking water program

~~John~~ Jon Erickson 303-692-3593

review process to ensure that DW meets regulation
drinking water design - "solid" prediction of wastestream

solid waste - Walter Avramenko 303-692-3362

Sterling - selenium bigger issue than Uranium
treating waste stream to reduce inj. volume

ECCV - improving aesthetic nature of water - salt is the driver

CO Study on Radionuclide Abatement & Disposal Strategy
CO-RADS (Phase 3 - studies)

11/19/09

⇒ Joe Haberfeld UIC FL DEP

Desalination Well TDS - 3,000 – 10,000
resulting up to 30,000 mg/L
buoyancy factor, radionuclides
nitrogen – not a problem

11/23/09

Kirk Hoeffner (785) 296-1843

radioactive wells
high chlorides 7,000' deep
no monitoring wells
no corrosion issue → fiberglass - PVC tubing

11/19/09

Steve Tarlton
CDPHE Rads program

T-NORM guidance (website)

tiered system for disposal
depends on concentration

working on ponds w/ rad safety concern

What kind of concen. are of concern?

CO-RADS - surveyed 35 system and disposal

John Erickson DW group
303-692-3593

Discharge, Engr Design, DW gp

Solid Waste

25/33 system - getting engineering rpt

⇒ license under radioactive material

Barbara Delamont - septic tank/ "UIC"

no threshold see guidance for threshold

RMD - take a resin & be responsible for it's disposal.

WRT

RE: Florida Class I Desalination (RO) Concentrate Injection Wells

Haberfeld, Joe to: Wendy Cheung 11/20/2009 07:44 AM

History: This message has been replied to.

Wendy,

You're welcome. I should have mentioned that the tubing for RO injection wells should be non-corrosive material due to the corrosive nature of the injectate. I suggest FRP (fiberglass reinforced plastic), which is used for nearly every Florida RO injection well. Stainless steel would be acceptable also, with a type called Duplex steel having been used successfully in one RO well here. If you want more info on this let me know.

Joe Haberfeld

The Department of Environmental

Protection values your feedback as a customer. DEP Secretary Michael W. Sole is committed to continuously assessing and

improving the level and quality of services provided to you. Please take a few minutes to comment on the quality of

service you received. Copy the url below to a web browser to complete the DEP

survey: http://survey.dep.state.fl.us/?refemail=Joe.Haberfeld@dep.state.fl.us
Thank you in advance for completing the survey.

From: Cheung.Wendy@epamail.epa.gov [mailto:Cheung.Wendy@epamail.epa.gov]
Sent: Thursday, November 19, 2009 5:08 PM
To: Haberfeld, Joe
Subject: Re: Florida Class I Desalination (RO) Concentrate Injection Wells

Joe,

Thanks for getting the permits to me so quickly! I appreciate your help on this.

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

|------------>
| From: |
|------------>

>----------
|"Haberfeld, Joe" <Joe.Haberfeld@dep.state.fl.us>
|

>----------
|------------>
| To: |
|------------>

>----------
|Wendy Cheung/R8/USEPA/US@EPA
|

>----------
|----------->
| Date: |
|----------->

>----------
|11/19/2009 02:43 PM
|

>----------
|----------->
| Subject: |
|----------->

>----------
|Florida Class I Desalination (RO) Concentrate Injection Wells
|

>----------

Wendy,

I have attached 2 emails, each containing a Class I RO well permit. The FGUA Mirror Lakes permit is a construction permit, but it contains all the monitoring parameters. The N. Collier County permit is an operation permit. The monitoring schemes are basically the same, with the major difference being that the monitor wells start off with weekly samples for at least 6 months under the construction permit. If data looks good after 6 months they can revert to monthly MW sampling. The operation permits have monthly MW sampling. The injectate is monitored monthly for both permits.

Feel free to contact me with any questions.

Joe Haberfeld

Professional Geologist
Florida Department of Environmental Protection
Underground Injection Control Program
Mail Station 3530
Tallahassee, Florida
32399-2400
Phone 850-245-8655

----- Message from "LaMear, Julia" <Julia.LaMear@dep.state.fl.us> on Mon, 17 Aug 2009 13:18:11 -0500 -----

RE: Copy of Permit
Kirk Hoeffner to: Wendy Cheung 12/01/2009 12:36 PM

History: This message has been replied to.

Wendy,

We really haven't had any issues with corrosion - they did get some manganese oxide (black carbon like stuff) precipitating in the injection tubing and surge tank - this was believed to be due to the inlet pipe to the tank being above the fluid line most of the time and oxygenating the water as it filled the tank.

As far as the geochemical parameters, we knew these were in the natural water supply and would be concentrated with the RO process. We just require these to be monitored to see if there are any major changes outside of their normal operations. As you can see we don't have injection limits for these, so its really a monitoring function.

The VOCs do have limits - we are looking at 100 times the MCL as our guide for these compounds.

Kirk Hoeffner, LG
Unit Chief, Underground Injection Control
Geology Section, Bureau of Water
Kansas Department of Health & Environment
1000 SW Jackson St. Suite 420
Topeka, KS 66612-1367
Telephone: (785) 296-1843
Fax: (785) 296-5509

Website: www.kdheks.gov/geo

-----Original Message-----
From: Cheung.Wendy@epamail.epa.gov [mailto:Cheung.Wendy@epamail.epa.gov]
Sent: Monday, November 30, 2009 12:17 PM
To: Kirk Hoeffner
Subject: Re: Copy of Permit

Thanks Kirk for the permit!

I have a couple of follow up questions.

1) Have you experienced any tubing corrosion issues?
2) The table showing sampling parameters. How were these determined? I assume that the VOCs are part of the wastestream. What about the

sodium, calcium, sulfates, etc? I guess really the question is what are you looking for when these samples come back and what does it tell you?

Thanks again for your help,

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

From:	Kirk Hoeffner <khoeffner@kdheks.gov>
To:	Wendy Cheung/R8/USEPA/US@EPA
Cc:	Mike Cochran <mcochran@kdheks.gov>
Date:	11/24/2009 07:18 AM
Subject:	Copy of Permit

(Embedded image moved to file: pic23832.jpg)

Wendy,

As per our phone conversation, attached is a copy of the City of Hutchinson Permit. Call me if you have any questions.

Kirk Hoeffner, LG
Unit Chief, Underground Injection Control
Geology Section, Bureau of Water
Kansas Department of Health & Environment
1000 SW Jackson St. Suite 420
Topeka, KS 66612-1367
Telephone: (785) 296-1843
Fax: (785) 296-5509

Website: www.kdheks.gov/geo

[attachment "City of Hutchinson Well #1 Permit.doc" deleted by Wendy Cheung/R8/USEPA/US]

RE: ECCV Class I injection wells
Pat Obrien to: Wendy Cheung 08/17/2009 10:04 AM

Hi Wendy,

Since the treatment plant is not built yet, we do not have actual samples of the injectate water. We do have detailed sampling data for metals of the water that will be treated. We can come up with a pretty close estimate of the injectate water quality with these data since the proportion of the minerals in the water is linear as the concentration process proceeds.

I will send you a detailed summary of the metals data we have.

Patrick OBrien

-----Original Message-----
From: Cheung.Wendy@epamail.epa.gov [mailto:Cheung.Wendy@epamail.epa.gov]
Sent: Monday, August 17, 2009 7:47 AM
To: Pat Obrien
Subject: RE: ECCV Class I injection wells

Pat,

Yes, I need a representative sample of the injectate prior to injection (RO wastestream) to the best of your knowledge. We will require an actual sample prior to authorization to inject.

Thanks,

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

"Pat Obrien" <pwob@comcast.net>
08/13/2009 04:48 PM

To: Wendy Cheung/R8/USEPA/US@EPA
cc: "'Kipp Scott'" <kscott@eccv.org>
Subject: RE: ECCV Class I injection wells

Hi Wendy,

I am working on the spreadsheet as we speak. I will get it to you soon.

In item 1, I assume you want the metals tested in the water to be run through the future RO plant, correct? This water will contain the same metals as the future injectate, but in a diluted form. We can estimate the concentration of the metals in the injectate based on this data. We have six wells that produce the water that will be treated. If we have

already
done the testing you mention below, I will summarize the results and forward
them to you. If not, I would like to obtain and test one composite water
sample made up of water from as many of these six wells as possible. If you
would like additional sampling, please let me know.

Item 2--We would like to permit all the well sites all at once, although the
DI-2, DI-3 and DI-3 Alternate may or may not be constructed depending on how
the first well (DI-1) performs. I will get you the exact locations in the
spreadsheet mentioned above.

Items 3-- ECCV is working on this issue. I will mention your concerns
regarding the FR to Kipp Scott with ECCV.

Thanks,

Patrick OBrien

-----Original Message-----
From: Cheung.Wendy@epamail.epa.gov [mailto:Cheung.Wendy@epamail.epa.gov]

Sent: Thursday, August 13, 2009 11:48 AM
To: Pat Obrien
Subject: RE: ECCV Class I injection wells

Pat,

I've been looking through your permit to give you a heads up on
additional information that may slow down this process. However, I am
still waiting on the spreadsheet before doing a full review. Please get
that to me at your earliest convenience.

Some outstanding items:
1) I will need a more complete water quality analysis for heavy metals.
Please sample for the heavy metals provided in the following list:
http://www.epa.gov/region8/water/uic/metals-vocs.pdf
2) Are you planning on including all 3 wells including in the draft or
just work on DI-1 first? At one point we talked about just permitting
the first then add wells as you need them. The first permit (area
permit) will require public notice, but wells that are added to the
permit will not need to be public noticed unless there are extraordinary
circumstances. I will need to know exact location if you want to permit
them all at once.
3)financial responsibility (FR) - as I previously mentioned, getting the
FR approval has held up some of the permits that I have worked on, in
one case it took almost a year after the permit was ready to go to draft
before the FR was in place. Please start working on this to meet your
deadlines.

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

"Pat Obrien"
<pwob@comcast.ne
t>

To

Wendy Cheung/R8/USEPA/US@EPA

08/04/2009 03:34
PM

cc

Subject

I have tried to add additional wells several times as you described and still can't get it to work. Sorry.

Patrick

-----Original Message-----
From: Cheung.Wendy@epamail.epa.gov [mailto:Cheung.Wendy@epamail.epa.gov]

Sent: Monday, August 03, 2009 3:36 PM
To: Pat Obrien
Subject: RE: ECCV Class I injection wells

Pat,

Thanks for the reponse. To add additional AOR wells, you need to enter a number, hit enter and then click on the red button. The AOR wells are only the deep wells that penetrate the confining zone.

If you don't mind, could you still fill out the spreadsheet. It's really helpful because it frames the important information needed for the permit - the application can be large and details can be missed. I have found this an efficient tool for permit review. Thanks,

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

"Pat Obrien" <pwob@comcast.net>
08/03/2009 03:13 PM

To: Wendy Cheung/R8/USEPA/US@EPA
cc:
Subject: RE: ECCV Class I injection wells

On the second page of the XL file, the red button did not allow me to put in
data for more than one well.

Pat OBrien

-----Original Message-----
From: Cheung.Wendy@epamail.epa.gov [mailto:Cheung.Wendy@epamail.epa.gov]

Sent: Monday, August 03, 2009 11:53 AM

To: Pat Obrien
Subject: RE: ECCV Class I injection wells

Pat,

Thank you for the info. Can you explain what difficulty you were having so that we can fix it?

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

"Pat Obrien" <pwob@comcast.net>
08/03/2009 11:33 AM

To: Wendy Cheung/R8/USEPA/US@EPA
cc:
Subject: RE: ECCV Class I injection wells

Wendy,

I could not get the Excel spread sheets to work on my system.

However, I went through them and I believe that almost all of the information you requested is already in the permit application.

Note that all depths in the application are in depths from ground level, and
all well depths and designs are the same as DI-1 presented in the application.

Spud dates are unknown and will depend on the injection rates seen in the
field, but approximate spud dates are:

DI-1	April, 2010
DI-2	2011
DI-3 or DI-3 Alt.	2012

There are a few things missing, including:

Well Name	Location	Latitude/longitude
DI-1	NW, SW, 1, 1S, 66W	39 DEG 59.4586'N, 104 DEG. 43.7072'W
DI-2	NE, NE, 1, 1S, 66W	39 DEG. 59.9602'N, 104 DEG. 42.8485'W
DI-3	SW, NW, 12, 1S, 66W	

39 DEG. 58.8967'N

104 DEG.

43.8312'W
DI-3 ALT. NE, SE, 11, 1S, 66W
39 DEG. 58.7802'N

104 DEG.

44.1209'W

Well construction information is in Attachments L and M.

No wells will be plugged back.

Maximum injection pressures, fracture pressures, fracture gradients, radii
and porosities are unknown at this time, but will be defined by field testing.

Geologic setting information is in Attachments D and F.

Water quality information is in Attachment S.

Injectate density is expected be range from 8.3 to 8.4 lbs/gal.

One thing I did not understand is the request for a PBTD. If you can tell
me what this is, I will provide it.

Thanks,

Pat OBrien

-----Original Message-----
From: Cheung.Wendy@epamail.epa.gov [mailto:Cheung.Wendy@epamail.epa.gov]

Sent: Tuesday, July 21, 2009 8:33 AM
To: Pat Obrien
Subject: ECCV Class I injection wells

Pat,

I will start reviewing the application this week. One thing that I typically have applicants do is to fill out this short EXCEL spreadsheet? The purpose of this spreadsheet to get the data/info up front. Often times I get incomplete information in the application or need clarification and have to contact the operator multiple times. I have found this spreadsheet eliminates a lot of the back and forth and helps to speed up the permitting process. Thanks,

(See attached file: PermitApplicant.xls)

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

Metals and voc's for ECCV Class I injection well application
Pat Obrien
to:
Wendy Cheung
08/19/2009 11:36 AM
Cc:
"'Kipp Scott'"
Show Details

History: This message has been replied to and forwarded.

Wendy,

As you requested, I am providing a summary of the metals data you requested. The testing was done on water from the six existing production wells in 2005 and 2006. The metals data obtained at that time was actually total metals, not dissolved. This water will be run through a reverse osmosis system and the waste stream will be injected in to the injection well(s). We also have provided an estimate of the concentrations of the metals likely to be present in the injectate water (RO stream).

For your convenience, we have also attached the VOC results from the same sample sets.

Any question, please call.

Patrick OBrien

RE: ECCV Class I injection wells
Pat Obrien to: Wendy Cheung 08/20/2009 01:34 PM

Thanks Wendy,

POB

-----Original Message-----
From: Cheung.Wendy@epamail.epa.gov [mailto:Cheung.Wendy@epamail.epa.gov]
Sent: Thursday, August 20, 2009 12:56 PM
To: Pat Obrien
Subject: RE: ECCV Class I injection wells

Pat,

Please see below.

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

"Pat Obrien" <pwob@comcast.net>
08/20/2009 11:51 AM

To: Wendy Cheung/R8/USEPA/US@EPA
cc:
Subject: RE: ECCV Class I injection wells

Hi Wendy,

I am working on getting you the XL spreadsheet on the Class I wells for ECCV. I have a few questions:

All the following are unknown at this time, but I will give you are best estimates: spud dates, max. injection pressures, fracture pressures and gradients, radii and porosity.

SOME WELLS ARE CONVERTED WELLS AND NOT NEWLY CONSTRUCTED, IN YOUR CASE SPUD DATE IS N/A.
THE MAXIMUM INJECTION PRESSURE IS SOMETHING THAT YOU ARE REQUESTING FROM THE EPA BASED ON YOUR ESTIMATED FRACTURE GRADIENT, FRACTURE PRESSURE DEPTH (I.E. TOP OF PERFORATION) AND SPECIFIC GRAVITY OF FLUID. BASED ON WELL LOGS, WELL SIZE, AND MANY OTHER FACTORS, THE ENGINEER HAS SOME IDEA OF THE PRESSURE NEEDED TO MOVE THE FLUID.
FRACTURE PRESSURE DEPTH = TOP OF PERFORATION OR TOP OF INJECTION ZONE
FRACTURE GRADIENT NEEDS TO BE ESTIMATED BASED ON LITERATURE OR OFFSET WELL
RADII AND POROSITY IS ONLY REQUIRED IF YOU NEED AN AQUIFER EXEMPTION

AN AQUIFER EXEMPTION IS NEEDED IF THE INJECTION ZONE IS LESS THAN 10,000 MG/L TDS

For the maximum injection pressure, I assume you want an estimate for each
perforated zone?
YOU WILL HAVE MORE THAN ONE INJECTION PRESSURE IF YOU HAVE DUAL COMPLETION AND I DOUBT YOU DO.

Also, for the fracture pressure and gradient and radius you request, are you
looking for the information during a possible frac. job prior to injection?
During injection there will be no fracturing occuring.
IT IS FRACTURE PRESSURE DEPTH - SEE ABOVE

As to aquifer exemptions, I do not know the status of any of the formation
in that regard.
SEE ABOVE

What is a zone type?
IF A ZONE HAS LESS THAN 10,000 MG/L TDS, IT IS AN AQUIFER,
INJECTION - SELF-EXPLANATORY
CONFINING ZONE - THE ZONE THAT WILL KEEP THE INJECTED FLUID IN PLACE

What do you mean by plugged back TD? The wells will not be plugged unless
they are to be abandoned.
OFTEN TIMES THE WELL IS DRILLED TO X FT, FOR ASSORTED REASONS, THEY WILL PLUG OFF THE BOTTOM Y FT AND THAT BECOMES THE PBTD.

We are not 100 percent certain where each well will be because the treatment
plant has not been designed yet. The State Engineer allows a well to be drilled within 200 feet of the permitted site. Does the EPA have a similar
allowance for these wells?
THE PERMIT WILL BE WRITTEN WITH A SPECIFIC LOCATION. IF YOU NEED TO MOVE THE WELL, THEN YOU'LL HAVE TO COME IN FOR A MINOR MODIFICATION TO THE PERMIT.

-----Original Message-----
From: Cheung.Wendy@epamail.epa.gov [mailto:Cheung.Wendy@epamail.epa.gov]

Sent: Tuesday, July 21, 2009 8:33 AM
To: Pat Obrien
Subject: ECCV Class I injection wells

Pat,

I will start reviewing the application this week. One thing that I typically have applicants do is to fill out this short EXCEL spreadsheet? The purpose of this spreadsheet to get the data/info up front. Often times I get incomplete information in the application or need clarification and have to contact the operator multiple times. I have found this spreadsheet eliminates a lot of the back and forth and helps to speed up the permitting process. Thanks,

(See attached file: PermitApplicant.xls)

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

RE: ECCV XL summary
Pat Obrien to: Wendy Cheung 09/15/2009 11:10 AM

History: This message has been replied to.

Wendy,

Please consider the locations on the spreadsheet as final. If we want to drill more than 3 wells, we will modify the permit. But at this time, it is extremely unlikely that we will be drilling more than 3 wells.

I have tried a dozen times to get your XL spreadsheet filled out, but it just does not work on my machine.

Mid November for the public notice will work fine for us. ECCV just wanted to get a feel for the probable approval date. It looks like maybe some time in January?

Patrick

-----Original Message-----
From: Cheung.Wendy@epamail.epa.gov [mailto:Cheung.Wendy@epamail.epa.gov]
Sent: Monday, September 14, 2009 3:49 PM
To: Pat Obrien
Subject: Re: ECCV XL summary

Pat,

When will you have the location nailed down? What is the deciding factor? Will you be drilling all 4 or is more of a surface issue and aquiring land rights?

The process is same regardless of applicant.

Given my present schedule, the latest for the public notice to go out would be mid-November. There is a 30 day public comment period after the draft, then the final permit can be issued. But again this is assuming that the FR has been done. If this schedule doesn't work for you, please let me know ASAP.

Just FYI, in the future, please don't modify the spreadsheet. The information that is contained in the spreadsheet is directly transferred to another file. When the spreadsheet has been moved around/modified the transfer does not work. There are data quality controls on the spreadsheet that is lost when the spreadsheet is manipulated. If you can, it would be much appreciated if you could put the data for at least one of the wells in the original spreadsheet that I sent you. I'm attaching the original spreadsheet. Thanks,

(See attached file: PermitApplicant.xls)

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

|------------>
| From: |
|------------>

>----------
|"Pat Obrien" <pwob@comcast.net>

>----------|
|---------->
| To: |
|---------->

>----------|
  |Wendy Cheung/R8/USEPA/US@EPA
|

>----------|
|---------->
| Date: |
|---------->

>----------|
  |09/14/2009 03:17 PM
|

>----------|
|---------->
| Subject: |
|---------->

>----------|
  |ECCV XL summary
|

>----------|

Hi Wendy,

Attached is the summary of the data you requested for the ECCV class I wells. I had to wait for information from several engineers before I could finalize the data. Per our application, we have specified four well locations, but will only drill a maximum of 3 wells. All four wells in the attached XL sheet are identical in design because the elevations of the wells and the deep geology are similar at each site and are within the plus or minus 100 foot uncertainty range in the depths of the formation tops/bottoms.

Other than the FR information (which ECCV is working on now), I believe this should complete all your requests.

ECCV wanted me to ask you a couple questions that have been posed by some of the board members:

Is the application process the same for the ECCV water district as it is for other private applicants?

Any idea of the timing of the public comment period and final permit approval?

Thanks,

Patrick OBrien

[attachment "EPA Class I well summary for ECCV.xls" deleted by Wendy Cheung/R8/USEPA/US]

RE: ECCV Class I well
Pat Obrien
to:
Wendy Cheung
11/04/2009 03:41 PM
Show Details

History: This message has been replied to.
Wendy,

Thanks for your quick response.

I do have additional water quality data points (I believe I have 38 TDS levels from various wells in Adams and Weld counties), but for the table on page 49 I used the TDS data from the sites that were closes to the ECCV wells, as I believe they are the best indicator of what we will encounter in our wells.

But as you say, since this is a new drill, we may as well wait until we can review the actual geophysical logs from our first well and then revise the P and A plan accordingly.

So to keep from delaying anything I will keep the current P and A plan in place, provide you with a signed 7520-14, and will revise the plan after reviewing site specific data with the EPA.

Who should sign the P and A plan, an officer of ECCV, or the petroleum engineer who put the plan together?

Patrick

From: Cheung.Wendy@epamail.epa.gov [mailto:Cheung.Wendy@epamail.epa.gov]
Sent: Wednesday, November 04, 2009 1:59 PM
To: Pat Obrien
Subject: Re: ECCV Class I well

Pat,

As I mentioned to you over the phone yesterday, the D and J Sands are USDWs in the area based on data from the USGS database, but this same datebase is also showing USDWs in Ingleside and Lyons. Do you have additional data points on water quality from the single values that you submitted on pg 49? I'll see if I can someone in GIS plot the data so that it can be more easily viewed and analyzed.

Since this is a new drill, the P&A plan may be revised after the well is drilled and the resistivity log can be reviewed. Perhaps, we can wait till we get site specific information. But for now, I will need a SIGNED 7520-14 P&A Plan. THe one submitted was not dated or signed.

Just a heads up. There has been some concern regarding the FR mechanism used, I believe it has to do with the cost of P&A and the assets available. I will let you know as soon as I find out any additional information.
Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

-----"Pat Obrien" <pwob@comcast.net> wrote: -----

To: Wendy Cheung/R8/USEPA/US@EPA

From: "Pat Obrien" <pwob@comcast.net>
Date: 11/03/2009 04:46PM
Subject: ECCV Class I well

Hi Wendy,

I looked at the plugging and abandonment diagram of Well DI-1 on page 44 of our application and I see what you are talking about. I believe our petroleum engineer did not design grout the inside of the 7-inch casing to the base of the Laramie Fox Hills aquifer (USDW). After thinking about it, he designed it this way because the USDWs from ground level to 1400 feet would already have been cemented twice. The first being between the 12.25 inch borehole and the 9 5/8 inch casing, and the second grout string being between the 9 5/8 inch casing and the 7 inch casing.

I believe with these two grout strings, plus the other grout plugs shown on page 44 of the application, the existing plugging and abandonment design is acceptable.

However, if you require a new plugging design, we should revise it as soon as possible because I assume we will also need to revise the FR along with it.

Let me know what you think, and I will get you the other requested information in the next day or so.

I thought this item was important enough to address separately.

Patrick OBrien

=

ECCV Class I well
Pat Obrien
to:
Wendy Cheung
11/05/2009 04:32 PM
Show Details

Hi Wendy,

I have some answers to your questions of 11-2-9.

1. As discussed, we would like to make sure that the Lower Satanka Formation is listed as a zone that will possibly be perforated throughout the application.

2. The anticipated concentration of uranium in the injectate listed in the table on page 25 of the application is incorrect as listed. As you pointed out, the uranium data should be listed as micrograms/liter. Good catch. The data are total uranium; we do not have a breakdown on the different isotopes present.

3. Radium (226 and 228), gross alpha, and gross beta data for the injectate are also attached. These data should be added to the table on page 25 of the application.

4. As we discussed on the P and A issue, we will leave the current P and A plan in place, but we will review and revise said plan to the EPA's satisfaction after the first well has been constructed and tested. At that time, we will have site specific data to put together the P and A design.

5. Andy Peterson, of Peterson Energy Management (our petroleum engineer) will be calling you regarding the other issues (cement bond logging, formation testing, and sampling).

Thank you for your attention to these matters.

Patrick OBrien

RE: ECCV Class I wells
Pat Obrien to: Wendy Cheung 11/25/2009 09:48 AM

History: This message has been replied to.

Wendy,

Thank you for the quick response. I sent you an email yesterday just about the same time you sent the message below to me, so you probably did not see it before you wrote your email. That email details the RO membrane cleaning procedure. It turns out, none of the material cleaned from the membranes will be fed into the injection well. It will flow into the sanitary sewer system where it will be treated by the wastewater treatment plant.

The mud density change from 9.0 to 9.2 lb/gal for the P and A plan is acceptable to us. Also, a 100 foot cement plug in the P and A plan centered on the Dakota-Morrison boundary is acceptable to us. I appreciate you making changes on your end on these two items.

Per yesterday's email, Kipp Scott will be signing the P and A form and mailing it to you.

-----Original Message-----
From: Cheung.Wendy@epamail.epa.gov [mailto:Cheung.Wendy@epamail.epa.gov]
Sent: Tuesday, November 24, 2009 3:38 PM
To: Pat Obrien
Subject: RE: ECCV Class I wells

Pat,

UIC Regs in 40 CFR 144.3 Radioactive Waste means any waste which contains radioactive material in concentrations which exceed those listed in 10 CFR part 20, appendix B, table II, column 2.

Below is the link to the 10CFR20:
http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=f3e59051ed6b3e1cfd6402768b12b8d4&rgn=div9&view=text&node=10:1.0.1.1.16.15.76.3.8&idno=10

For the P&A plan, we need to change the mud from 9.0 to 9.2. And let's add another plug below the Dakota, it'll be 100 ft centered on the Dakota and Morrison interface. If you're agreeable to this, I'll just make the changes here.

I'll still need the expected concentration of the waste fluid from the membrance cleaning and signed P&A plan. I think that covers it.
Thanks,

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

|------------>
| From: |
|------------>

>----------
|"Pat Obrien" <pwob@comcast.net>
|

>----------
|------------>

To:
Wendy Cheung/R8/USEPA/US@EPA
Date:
11/19/2009 04:30 PM
Subject:
RE: ECCV Class I wells

Wendy,

For the first five years of operation or so, the single pass brine water will be the only water injected in the well(s). If the second pass salt water RO membrane is installed, the single and double pass injection water may be mixed so that the injection water quality may be an average of the two. After five years, it is also possible that the injection water may consist only of "two pass" water and the quality of the injectate will be at the high range of the values estimated.

As for membrane cleaning, I will consult our experts on that one and get back to you.

In regards to the water quality testing, when we request a TDS test, that is the only parameter tested for. All the other parameters listed would be extra. I believe I provided the parameters listed on page 25 because they were available from the water testing done on the municipal wells. Of course, the quality of the brine was then estimated by concentrating those municipal well quality data.

As to contact with the CDPHE, the only contact I had with them was several months ago at which time they told me that they had no regulatory requirements relative to the injection wells. However, I will contact them about any TENORM related requirements.

As always, thanks for you help on this project.

Date:
11/18/2009 11:38 AM
Subject:
RE: ECCV Class I wells

Wendy,

For the low range water values, treatment involves one pass of the feed water from the production wells through a "fresh water" RO membrane. For the high range water values, the treated brine goes through a second salt water RO membrane and is further concentrated. The range of variation of the quality of the feed water from the production wells appears, over the past year, to vary less than one percent. We believe the variability of the quality of the feed water in the future will be about the same.

I estimate that our low and high range values of the treated water are within 5 to 10 percent of the actual values we will see in the future. When the RO membranes become clogged, they will be cleaned or replaced. Even when the RO membranes are partially clogged, the membranes will still function (although at a slower rate) and the quality of the treated water will not change significantly because of this clogging.

It is my understanding that the second "pass" through the salt water membrane is a very expensive proposition and ECCV will probably not have one installed until around 2016 or so.

Patrick OBrien

-----Original Message-----
From: Cheung.Wendy@epamail.epa.gov [mailto:Cheung.Wendy@epamail.epa.gov]

Sent: Tuesday, November 17, 2009 7:40 AM
To: Pat Obrien
Subject: RE: ECCV Class I wells

Pat,

The estimated injectate concentration values that were submitted, there is a high and low range. The application states that there's variation

Patrick OBrien

-----Original Message-----
From: Cheung.Wendy@epamail.epa.gov [mailto:Cheung.Wendy@epamail.epa.gov]

Sent: Thursday, November 19, 2009 1:39 PM
To: Pat Obrien
Subject: RE: ECCV Class I wells

Pat,

Additional clarification on the range of values provided. The low is one pass, the high is two passes. Will these fluids be combined prior to injection into the disposal well, such that the concentration will never be the "high" range? Or will there be a circumstance such that the "high" (two pass) reject water will go directly into the injection well?

Also, when the membrane is cleaned, what is the process used and will the cleaning solution/washwater be disposed of into the injection well. If so, what would those concentrations be?

You provided a table on page 25, are those typically a standard suite of test (I suppose minus Uranium) that you will get back from the laboratory? In another words if you ask the lab to sample for TDS, will you also get back the ions (calcium, sulfate, etc), pH, Nitrate, Corrosivity Index as part of a standard set of constituents that gets tested.

And have you contacted CDPHE drinking water program and are aware of the TENORM guidance they have on handling these types of wastes. I haven't reviewed it thoroughly to see if this apply to your system (concentration levels), but thought I'd mention it.

Thanks,

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

|------------>
| From: |
|------------>

>----------

---|
|"Pat Obrien" <pwob@comcast.net>
|

>----------

---|
|------------>
| To: |
|------------>

>----------

---|
|Wendy Cheung/R8/USEPA/US@EPA
|

>----------

---|
|------------>

>----------

---|
RE: ECCV Class I wells
|

>----------

---|

Wendy,

When I referred to the Beebe Draw wells or wellfield, I am talking about the
12 wells you mention below.

Currently ECCV is pumping water from the Beebe Draw wellfield, blending it
with drinking water purchased from an outside source and put to municipal
use. The only treatment done on the resulting blended water is chlorination
and sometimes a sequestering agent for iron.

POB

-----Original Message-----
From: Cheung.Wendy@epamail.epa.gov [mailto:Cheung.Wendy@epamail.epa.gov]

Sent: Thursday, November 12, 2009 5:08 PM
To: Pat Obrien
Subject: RE: ECCV Class I wells

Pat,

Just so I get the terminology correct, you talk about the Beebe Draw, this isn't one well, correct? It's the drinking water wellfield located approximately one mile south of Lochbuie, Colorado which consists of 12 wells?

More of a curiosity question. Are you saying that presently ECCV can provide drinking water by blending the drinking water well with an external source without ANY treatment?

Thanks,

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

|---------->
| From: |
|---------->

>----------

---|
"Pat Obrien" <pwob@comcast.net>

in the quality of feed water. Can you give me an idea of the range in the feed water? Also, what is the more aggressive technique? Multiple passes?

Since the RO isn't running, these numbers are estimated. How good of a handle do you have on the resulting injectate from the RO? How much variation is there through the life of the RO as the system gets clogged and become less efficient?

Essentially, I'm trying to understand how much variation there could be in the injectate concentrations and why there would be a variation. Any other info you have on this is helpful.

Thanks,

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

|------------>
| From: |
|------------>

>----------

---|
|"Pat Obrien" <pwob@comcast.net>
|

>----------

---|
|------------>
| To: |
|------------>

>----------

---|
|Wendy Cheung/R8/USEPA/US@EPA
|

>----------

---|
|------------>
| Date: |
|------------>

>----------

---|
|11/13/2009 12:55 PM
|

>----------

---|
|------------>
| Subject: |
|------------>

I
will run this by Andy, but I would think we could use a spinner in the top
zone if two more zones are comingled during testing

3. Again, if you are referring to the four zones described in my 11-11-9
email below, we can easily get four water samples and test for TDS. If you
are requesting a TDS sample from each geologic formation, this will be more
time consuming and cause additional expense.

4. As of now, ECCV cannot use the ground water from the municipal well in
Beebe Draw without blending it with other cleaner sources because the water
quality does not meet all National Primary and Secondary Drinking Water
Standards. Of course this water quality varies with time and well location,
but in general, ECCV will be required to treat the Beebe well water for
elevated levels of gross alpha, TDS, fluoride, and iron. Levels of uranium
and nitrates may also be elevated and may require treatment.

ECCV is currently blending their Beebe Draw water with other cleaner sources
and will do so until about 2011 at which time the withdrawal rates from the
well field will triple and their reverse osmosis treatment plant will go on
line. At that time, adequate blending water will not be available and
treatment will begin. It is the brine from this plant that will require
disposal. With the above in mind, we estimate that the first deep brine
injection well should be completed in the first two months of 2010 to be
able to deliver treated water in 2011.

Hope this helps.

Patrick OBrien

-----Original Message-----
From: Cheung.Wendy@epamail.epa.gov [mailto:Cheung.Wendy@epamail.epa.gov]

Sent: Thursday, November 12, 2009 2:49 PM
To: Pat Obrien
Subject: Re: ECCV Class I wells

Pat,

Thanks for the summary. I do have additional comments.

Since this is a new drill and we don't have specifics on the geology and
water quality at the depths that you are at, there will be an evaluation
period after the open hole logs are run. In another words, I would like
to have the open hole logs evaluated and submitted to EPA prior to the
perforating the well. I think this will be advantageous to all in the
long run. If we plan this properly, I can manage my workload to make
sure that this gets immediate attention so that there's no delay on your
end.

#2: I may have mentioned this to you already, but if there are two or
more zones opened, I would like to put a spinner in the top zone to get
additional information on which formation is actually fracing.
Particularly if we decide that the fracture gradient information for
first well drilled will be used in the other two wells, I would like to
get as much information as possible on the first well.
#3: I will need to have water samples tested for each proposed zone.
My proposal is that we evaluate the resistivity log to get an estimate
of the TDS. Depending on that information, we may be able to sample
just the formations that will initially be perforated upon completion
and then require water samples from new formations in the future as they

|

>----------

----------|
|---------->
| To: |
|---------->

>----------

----------|
|Wendy Cheung/R8/USEPA/US@EPA
|

>----------

----------|
|---------->
| Date: |
|---------->

>----------

----------|
|11/12/2009 03:47 PM
|

>----------

----------|
|---------->
| Subject: |
|---------->

>----------

----------|
|RE: ECCV Class I wells
|

>----------

----------|

Wendy,

I believe we can both evaluate the open hole logs prior to perforating. There should be at least a few days between cementing the annulus and perforating for said evaluation.

2. When you say "zones" I assume you are referring to the four zones you
and Andy Peterson talked about and I described in my email of 11-11-9.

are perforated. The reason for this is that we need to make sure that there are no USDWs below any of the injection formations proposed - by definition, Class I wells must inject below all USDWs.

Finally, I want to provide additional information in the Statement of Basis on the rationale for this injection well. Across the country there has been increase in injection wells for RO disposal, is the RO system required to meet drinking water (DW) standards for radionuclides? Is ECCV under any deadlines to meet DW standards?

Thanks,

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

|------------>
| From: |
|------------>

>----------

---|
|"Pat Obrien" <pwob@comcast.net>
|

>----------

---|
|------------>
| To: |
|------------>

>----------

---|
|Wendy Cheung/R8/USEPA/US@EPA
|

>----------

---|
|------------>
| Date: |
|------------>

>----------

---|
|11/11/2009 02:50 PM
|

Subject: ECCV Class I wells

Hi Wendy,

It is my understanding that you talked with Andy Peterson, our petroleum engineer on the injection well project, about the questions you had a few days ago.

This note is to confirm Peterson's summary of said conversation.

1. All injection testing will be done prior to any well stimulation.
2. We will break the perforated zone into four separate zones. The first zone will include the Missourian Fm., the second will contain the Admire and Virgil, the third will contain the Wolfcamp, Amazon and Council Grove, and the fourth will contain the Lyons and Lower Satanka. Step tests consisting of four steps each, will be conducted on each of these four zones. A final step test will then be conducted on the entire perforated zone (which includes all perforated areas). This step test will consist of seven steps at different injection rates. This final step test will be conducted using bottom-hole gauges and will be used to define the maximum injection rate and pressure for the well.
3. We will obtain one water sample from each of the four zones described in item 2 above and test each for total dissolved solids.
4. We will run a cement bond log (CBL) from total depth to ground level and analyze the cement bond for acceptability. If necessary, additional CBL logs may be run to further evaluate zones of interest. Of course, we will review these logs in conjunction with EPA personnel.

If you would like to revise or add to the above, please let me know.

Patrick OBrien

Site boundary
Pat Obrien
to:
Wendy Cheung
12/01/2009 10:43 AM
Show Details

Hi Wendy,

Here are the locations of the corners for the ECCV permitted area for the Class I injection well site. The first point is the northeast corner and the remaining corners proceed clockwise from the first point.

My abbreviations refer to section lines, e.g. FS is feet from south section line, FN is feet from north section line, etc.

190 FN, 650FW, 6, 1S, 65W

1080 FN, 1510 FW, 12, 1S, 66W

2180 FN, 1510 FW, 12, 1S, 66W

2180 FN, 0 FW, 12, 1S, 66W

2900 FN, 775 FE, 11, 1S, 66W

2690 FN, 960 FE, 11, 1S, 66W

1890 FN, 0 FE, 11, 1S, 66W

640 FS, 0 FW, 1, 1S, 66W

190 FN, 0 FE, 1, 1S, 66W

Cheers,

Patrick OBrien

Submitted w/email 11/5/09

* max concentration exceeds MCLs
✓ min concentration exceeds MCLs

✓ Calcium ✓ Nitrate ✓ Fluoride ✓ Iron ✓ Strontium ✓ Sodium ✓ conductivity

Total Metals Summary ECCV Beebe Wells (mg/l)

Parameter	Well P6	Well E7A	Well P8	Well P11	Well P12	Well P13	Average for wellfield	Est injectate conc minimum mg/l	Est injectate conc maximum mg/l		MCL mg/L
Antimony	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	x	0.006
Arsenic	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	x	0.01
Barium	0.034	0.041	0.028	0.022	0.04	0.097	0.044	0.33	1.6		2
Beryllium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	x	0.004
✓ * Boron	0.27	0.25	0.25	0.21	0.26	0.25	0.25	1.9	9		1.4
Cadmium	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	x	0.005
* Chromium	0.0089	0.0076	<0.006	<0.006	<0.006	0.0072	0.006	0.04	0.2		0.1
Copper	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	x	1.3
✓ Iron	0.47	0.54	0.46	0.62	0.45	0.58	0.52	3.9	19		5
Lead	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	x	0.015
Manganese	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	x	0.8
Mercury	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	x	0.002
Molybdenum	<0.005	0.0062	<0.005	0.0052	0.0053	<0.005	0.005	0.04	0.19		0.04
Nickel	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	x	0.1
* Selenium	0.0023	0.006	0.0027	0.003	0.0024	0.0033	0.0033	0.02	0.12		0.05
Silver	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	x	0.1
✓ * Strontium	1.5	1.8	1.4	1.5	1.7	1.9	1.63	12	61		4
Thallium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	x	0.002
Zinc	<0.005	0.013	0.0074	0.0054	<0.005	0.013	0.0081	0.006	0.3	x	2

Estimated Injectate Water Quality--ECCV Class I Wells				MCL
Parameter	Low Value	High Value	Average Value	
Gross Alpha, pCi/l	120 +/- 30	600 +/- 150	360 +/- 90	15 pCi/l
Gross Beta, pCi/l	37.5 +/- 15	188 +/- 75	113 +/- 45	4 mrems/yr
Radium 226, pCi/l	1.9 +/- 1.6	9.4 +/- 8.2	5.6 +/- 4.9	} combined 5 pCi/L
Radium 228, pCi/l	4.0 +/- 4.5	20 +/- 22.5	12 +/- 13.5	

All data with variability at 95% confidence level

Uranium total ug/L 150 750 450 30 ug/L

submitted w/ email 11/5/09

VOC's--ECCV Beebe Wells (ug/l)

Parameter	Well P6	Well E7A	Well P8	Well P11	Well P12	Well P13
1,1,1,2 Tetrachloroethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1 Trichloroethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2 Tetrachloroethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2 Trichloroethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1 Dichloroethylene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2 (cis) Dichloroethylene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2 (trans) Dichloroethylene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,3 Trichloropropane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2,4 Trichlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylene Dibromide	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1,2 Dichlorobenzene o-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2 Dichloroethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2 Dichloropropane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3 Dichlorobenzene m-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4 Dichlorobenene p-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
2 Chlorotoluene o-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
4 Chlorotoluene p-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Benzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromobenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromochloromethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane (THM)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform (THM)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromomethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon tetrachloride	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorobenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chlorodibromomethane (THM)	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroform (THM)	<0.5	<0.5	<0.5	<0.5	<0.5	0.53
Chloromethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dichloromethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexachlorobutadiene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Isopropylbenzene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Napthalene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Perchloroethylene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Styrene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total Trihalomethanes	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Vinyl chloride	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Total xylenes	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

ECCV - Northern system water quality.

	Parameters	Units			Avg.	Max	Min	Std. Dev.	Count
Inorganics	Alkalinity - total	mg/l-$CaCO_3$			**244.8831**	291	212	16.591829	77
	Alkalinity - Bicarbonate	mg/l-$CaCO_3$			**246.4643**	291	212	17.6830317	56
	Calcium	mg/l			**81.98194**	98	72	5.49674235	72
	Bromide	mg/l			**0.30276**	0.46	0.18	0.05270775	25
	Chloride	mg/l			**94.93273**	115	77.5	6.50145438	55
	Conductivity	µs/cm			**989.4533**	1130	866	55.9534781	75
	Cyanide (CN), Total	mg/l		0.2	0.010	0.013	0.010	0.001	8.000
	Fluoride	mg/l		4	**1.861333**	2.3	1.5	0.1584497	75
	Hardness - Calcium	mg/l-$CaCO_3$			**199**	230	182	26.8886593	3
	Hardness - Magnesium	mg/l -$CaCO_3$			**140.5405**	160	100	15.8018891	37
	Hardness - total	mg/l-$CaCO_3$			**342.5**	400	300	19.4679223	76
	Hydrogen Sulfide	mg/l			0.5	0.5	0.5	0.0	8.0
	Langelier Index				0.20	0.41	-0.13	0.22	8.00
	Nitrate-N	mg/l-N		10	1.88	13.10	0.34	1.87	70.00
	Nitrite-N	mg/l-N		1	0.25	0.38	0.03	0.16	11.00
	Nitrate + Nitrite	mg/l			**2.074281**	13.1	0.496	2.40265637	32
	Nitrogen:Ammonia	mg/l			0.8	0.8	0.8	0.0	8.0
	Nitrogen: Kjeldahl	mg/l			0.4	0.6	0.3	0.1	5.0
	pH	-			7.53	8.81	7.08	0.24	39.00
	Phosphorus - total	mg/l			0.30	1.00	0.05	0.31	8.00
	Potassium	mg/l			**3.322143**	3.9	0.1	0.96454197	14
	Silica	SiO_2, mg/l			15.9	18.8	7.3	3.8	53.0
	Sulfate	mg/l			**175.4821**	241	149	15.2851575	56
	Temperature	°C			**18.85833**	20	12.2	2.69695395	12
	TDS	mg/l		500	**680.4231**	797	610	32.2258746	78
	Turbidity	NTU			0.36	2.61	0.10	0.49	36.00
	Total Solids	mg/l			**657.7667**	804	150	102.953851	30
	TSS	mg/l			**5**	5	5	0	5
	Total Residual Chlorine	mg/L			**2.04**	10	0.05	4.44977528	5
	COD	mg/l			**11.8**	17	10	2.94957624	5
	BOD	mg/l			**8.01**	10	0.05	4.44977528	5
Metals									
	Aluminum	mg/l			0.1000	0.1000	0.1000	0.0000	9.0000
	Antimony Trec	mg/l		0.006	0.0024	0.0060	0.0020	0.0013	9.0000
	Arsenic, Trec	mg/l		0.01	0.0074	0.0500	0.0020	0.0160	9.0000
	Barium Trec	mg/l		2	0.0420	0.0910	0.0210	0.0194	28.0000
	Boron	mg/l		1.4	0.2450	0.2660	0.2300	0.0139	5.0000
	Beryllium Trec	mg/l		0.004	0.0013	0.0040	0.0003	0.0011	9.0000
	Cadmium, Trec	mg/l	<	0.005	0.0009	0.0050	0.0005	0.0014	11.0000
	Chromium, Cr^{+3}, Trec	mg/l			0.0047	0.0089	0.0022	0.0021	14.0000
	Chromium, Hexavalent	mg/l		0.1	0.0100	0.0100	0.0100	0.0000	5.0000
	Copper (Cu), Trec	mg/l	<	1.3	0.0100	0.0100	0.0100	0.0000	10.0000
	Cobalt, Trec	mg/l			0.0015	0.0022	0.0010	0.0006	5.0000
	Iron - total	mg/l		5	0.1847	0.6200	0.0700	0.2003	15.0000
	Lead (Pb), Trec	mg/l	<	0.015	0.0020	0.0020	0.0020	0.0000	9.0000
	Magnesium Trec	mg/l			34	42	25	4	76
	Manganese, Trec	mg/l		0.8	0.0102	0.0556	0.0050	0.0119	22.0000
	Mercury (Hg), Trec	mg/l		0.002	0.0005	0.0020	0.0001	0.0008	9.0000
	Nickel, Trec	mg/l	<	0.1	0.0083	0.0100	0.0005	0.0038	11.0000
	Potassium Trec	mg/l			4.2079	26.0000	2.5000	4.2030	29.0000
	Selenium, Trec	mg/l		0.05	0.0032	0.0081	0.0020	0.0016	17.0000
	Silver (Ag), Trec	mg/l		0.1	0.0002	0.0002	0.0002		1.0000
	Sodium	mg/l			100	120	84	8	76
	Strontium Trec	mg/l		4	1.7	2.0	1.4	0.2	22.0
	Thallium Trec	mg/l		0.002	0.0011	0.0020	0.0003	0.0005	9.0000
	Uranium Trec.	mg/l		.03	0.0193	0.0260	0.0120	0.0035	26.0000
	Zinc, Trec	mg/l		2	0.03	0.10	0.01	0.02	14.00

	Parameters	Units		Avg.	Max	Min	Std. Dev.	Count
Disinfection By-Products:								
	TOC	mg/l		**1.85**	2.40	0.50	0.26	77.00
	TOX	ug/l		**16.85**	24.30	1.80	7.78	6.00
	DOC	mg/l		**2.04**	2.80	0.50	0.32	63.00
Misc:	Total Phenol	ug/l		**50**	50	50	0	5
	Oil and Grease	mg/l		**5**	5	5	0	5
	SUVA @254	m-l		**1.365222**	1.84	0.915	0.21830221	63
	UV absorbance @ 254nm	L/mg-m		**2.730723**	3.6	1.9	0.34841377	83
RADS								
	Gross alpha	pCi/l	15	**16**	23	8		40
	Gross beta	pCi/l		**6.6**	6.6	6.6		40
	Radium-226	pCi/l	5	**0.1**	0.1	0.1		40
	Radium-228	pCi/l		**0.9**	0.9	0.9		40
	Radon	pCi/l	300	**460**	460	460		40
EPA VOC's	**Volatile Compounds**	**Units**						
	Benzene	ug/l			0	0		29
	Bromobenzene	µg/l			0	0		29
	Bromochloromethane	µg/l			0	0		29
	Bromodichloromethane	µg/l	80	**34.8**	36.6	33	2.54558441	29
	Bromoform	µg/l	80	**12.56**	15.2	9.92	3.7335238	29
	Bromomethane	µg/l			0	0		29
	n-Butylbenzene	µg/l			0	0		29
	sec-Butylbenzene	µg/l			0	0		29
	t-Butylbenzene	µg/l			0	0		29
	Carbon tetrachloride	µg/l			0	0		29
	Chlorobenzene	µg/l			0	0		29
	Chloroethane	µg/l			0	0		29
	Chloroform	µg/l	80	**15.9**	16.1	15.7	0.28284271	29
	Chloromethane	µg/l			0	0		29
	2-Chlorotoluene	µg/l			0	0		29
	4-Chlorotoluene	µg/l			0	0		29
	Dibromochloromethane	µg/l		**19.93**	46.7	0.6	23.1232552	29
	Dibromomethane	µg/l			0	0		29
	1,2-Dichlorobenzene	µg/l			0	0		29
	1,3-Dichlorobenzene	µg/l			0	0		29
	1,4-Dichlorobenzene	µg/l			0	0		29
	Dichlorodifluoromethane	µg/l			0	0		29
	1,1-Dichloroethane	µg/l			0	0		29
	1,2-Dichloroethane	µg/l			0	0		29
	1,1-Dichloroethene	µg/l			0	0		29
	cis-1,2-Dichloroethene	µg/l			0	0		29
	trans-1,2-Dichloroethene	µg/l			0	0		29
	1,2-Dichloropropane	µg/l			0	0		29
	1,3-Dichloropropane	µg/l			0	0		29
	2,2-Dichloropropane	µg/l			0	0		29
	1,1-Dichloropropene	µg/l			0	0		29
	cis-1,3-Dichloropropene	µg/l			0	0		29
	trans-1,3-Dichloropropene	µg/l			0	0		29
	Ethylbenzene	µg/l			0	0		29
	Hexachlorobutadiene	µg/l			0	0		29
	Isopropylbenzene	µg/l			0	0		29
	p-Isopropyltoluene	µg/l			0	0		29
	Methylene chloride	µg/l			0	0		29
	Naphthalene	µg/l			0	0		29
	n-propylbenzene	µg/l			0	0		29
	Styrene	µg/l			0	0		29
	1,1,1,2-Tetrachloroethane	µg/l			0	0		29

	Parameters	Units	Avg.	Max	Min	Std. Dev.	Count
	1,1,2,2-Tetrachloroethane	µg/l		0	0		29
	Tetrachloroethene	µg/l		0	0		29
	Toluene	µg/l		0	0		29
	1,2,3-Trichlorobenzene	µg/l		0	0		29
	1,2,4-Trichlorobenzene	µg/l		0	0		29
	1,1,1-Trichloroethane	µg/l		0	0		29
	1,1,2-Trichloroethane	µg/l		0	0		29
	Trichloroethene	µg/l		0	0		29
	Trichlorofluoromethane	µg/l		0	0		29
	1,2,3-Trichloropropane	µg/l		0	0		29
	1,2,4-Trimethylbenzene	µg/l		0	0		29
	1,3,5-Trimethylbenzene	µg/l		0	0		29
	Vinyl chloride	µg/l		0	0		29
	m,p-Xylene	µg/l		0	0		29
	o-Xylene	µg/l		0	0		29
	Xylenes, Total	µg/l		0	0		29
Organics	***Organic Compounds***						
	Alachlor	ug/l		0	0		29
	Atrazine	ug/l		0	0		29
	Benzo(a)pyrene	ug/l		0	0		29
	Butachlor	ug/l		0	0		29
	Bis(2-Ethylhexyl)adipate	ug/l		0	0		29
	Bis(2-ethylhexyl)phthalate	ug/l	**3.112857**	11	0.71		29
	Metolachlor	ug/l		0	0		29
	Metribuzin	ug/l		0	0		29
	Propachlor	ug/l		0	0		29
	Simazine	ug/l		0	0		29
	1,2 -Dibromo -3-chloropropane	ug/l		0	0		29
Chlorinated pesticides and PCBs							
	Aldrin	µg/l		0	0		29
	g-BHC	ug/l		0	0		29
	a-Chlordane	ug/l		0	0		29
	g-Chlordane	ug/l		0	0		29
	Dieldrin	ug/l		0	0		29
	Endrin	ug/l		0	0		29
	HCCPD	ug/l		0	0		29
	Heptachlor	ug/l		0	0		29
	Heptachlor epoxide	ug/l		0	0		29
	Hexachlorobenzene	ug/l		0	0		29
	Methozychlor	ug/l		0	0		29
	Toxaphene	ug/l		0	0		29
	Chlordane	ug/l		0	0		29
	Aroclor 1016	ug/l		0	0		29
	Aroclor 1221	ug/l		0	0		29
	Aroclor 1232	ug/l		0	0		29
	Aroclor 1242	ug/l		0	0		29
	Aroclor 1248	ug/l		0	0		29
	Aroclor 1254	ug/l		0	0		29
	Aroclor 1260	ug/l		0	0		29
Chlorinated herbicides							
	2,4, D	µg/l		0	0		29
	Dicamba	ug/l		0	0		29
	Dalapon	ug/l		0	0		29
	Dinoseb	ug/l		0	0		29
	Pentachlorophenol	ug/l		0	0		29

	Parameters	Units	Avg.	Max	Min	Std. Dev.	Count
	Picloram	ug/l		0	0		29
	2,4,5-TP (Silvex)	ug/l		0	0		29
				0	0		29
Carbamates							
	3- Hydroxycarbofuran	ug/l		0	0		29
	Aldicarb	ug/l		0	0		29
	Aldicarb sulfone	ug/l		0	0		29
	Aldicarb sulfoxide	ug/l		0	0		29
	Carbaryl	ug/l		0	0		29
	Carbofuran	ug/l		0	0		29
	Methiocarb	ug/l		0	0		29
	Methomyl	ug/l		0	0		29
	Oxamyl	ug/l		0	0		29
	Propoxur	ug/l		0	0		29
	Endothall	ug/l		0	0		29
	Diquat	ug/l		0	0		29
Micro	Total Coliform			0	0		0
	E-coli		**<2**	<2	<2		38
	HPC	CFU/ml	**9030.15**	220000	1	40742.677	40
	MPA	EPA Risk		Mod	Low		68
		EPA Score	**1.558824**	18	0		68

Re: Rads in Drinking Water Treatment Residuals

Robert Duraski to: Wendy Cheung 11/10/2009 03:28 PM

History: This message has been replied to and forwarded.

Hi Wendy,

Here is the table I'm putting together for your group. The limits for gross alpha and beta are at the bottom. I'm not sure what to do with the gross alpha because our analytical error is larger that the 2 pCi/l limit. Angelique and I are reviewing Appendix B and putting together a list of isotopes your group should sample for along with the standards.

UIC Rad Limits.xls

As for converting ug of uranium to pCi, if we are in equilibrium (U-238 activity = U-234 activity), then 44 ug of uranium equals 30 pCi's of activity. So 900 ug/l X 30 pCi/44 ug=614 pCi/l which is 307 pCi/l of U-238 and 307 pCi/l of U-234 in equilibrium.

0.050 Rem/yr is a small dose but does exceed most EPA standards. Superfund guidance states that 0.015 Rem/yr poses a 3X10E(-4) risk. The 0.05 Rem is used since there will be dilution which will bring the exposure to less than 0.010 Rem/yr. ~ 3/10000 will get cancer

It would be easier if we got together and discussed the other questions. The answers are long, but simple. I'm out of the office the rest of the week. I'll be back next Monday.

Thanks,
RD
Wendy Cheung/R8/USEPA/US

In CO. 350 mrems/yr

Wendy Cheung/R8/USEPA/US
11/10/2009 10:47 AM

To Robert Duraski/R8/USEPA/US@EPA
cc
Subject Rads in Drinking Water Treatment Residuals

Bob,

This is a follow up to the meeting that Chuck called to discuss his permit. I too am working on a Class I well that will inject waste brine from treating drinking water through a reverse osmosis system. As you are aware, our UIC regulations consider concentrations that are above those found in 10CFR20 AppB, Table2, Column2 to be "radioactive waste". Here are the expected values of the injectate and related MCLs and conc from 10CFR20:

Estimated Injectate Water Quality–EC CV Class I Wells					
Parameter	Low Value	High Value	Average Value	10CFR20 AppB, Table2,Column2	MCL
Gross Alpha, pCi/l	120 +/- 30	600 +/- 150	360 +/- 90		15 pCi/L
Gross Beta, pCi/l	37.5 +/- 15	188 +/- 75	113 +/- 45		4 mrems/y
Radium 226, pCi/l	1.9 +/- 1.6	9.4 +/- 8.2	5.6 +/- 4.9	60 pCi/L	5 pCi/L (cc
Radium 228, pCi/l	4.0 +/- 4.5	20 +/- 22.5	12 +/- 13.5	60 pCi/L	

All data with variability at 95% confidence level

Uranium (total),ug/L	150	750	450	900 ug/L	conversion using activity of U 238

Does a value exist for Gross Alpha and Beta? I thought you had a value on the table you brought to the meeting. And I'm not quite sure what to do with Uranium, the reported value is ug/L, but the 10CFR20 is in uCi/mL which is specific to the isotope. You had mentioned that knowing the speciation of the uranium could double the concentration of total uranium. Since these are estimated values and the system doesn't have their RO in place, I would like to get an idea what their reported total uranium means relative to the NRC standards. I can require them to sample for individual isotopes if this is indeed important. At this point it's almost a labeling issue and will not have an effect on the permit.

Finally, can you tell me what these values mean in layman terms. I want to explain this in the statement of basis. Appendix B states:

"The concentration values given in columns 1 and 2 of table 2 are equivalent to the radionuclide concentrations which, if inhaled or ingested continuously over the course of a year, would produce a total effective dose equivalent of 0.05 rem (50 millirem or 0.5 millisieverts)."

[what impact does 0.05 rem have on humans?]

"The water concentrations were derived by taking the most restrictive occupational stochastic oral ingestion ALI and dividing by 7.3×10^{7} . The factor of 7.3×10^{7} (ml) includes the following components: the factors of 50 and 2 described above and a factor of 7.3×10^{5} (ml) which is the annual water intake of "Reference Man." "

Is this saying these concentrations are what we or the "Reference Man" is typically exposed to?

Thanks for your help,

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

20.1302

Re: Fw: Analysis for UIC Rad Waste
Robert Duraski to: Wendy Cheung 12/03/2009 10:39 AM

History: This message has been replied to.

Hi Wendy,

We use DOE methods. Th-230 is Method E907.0 and K-40 is Method E901 (see attached price list)

I have been thinking that we should add Pb-210 to the list of isotopic analysis just in case we have a higher gross beta reading than anticipated (the cost is $75/sample). As I mentioned, I haven't applied these regulations to a problem like yours, and I like to avoid going back for more samples.

Here is the price list, methods and reporting limits from Energy Labs in Casper Wy

http://www.energylab.com/asp/PricingGuide/docs/ELI_2009_Price_Guide_-_RadChem_v1-0.pdf

Enjoy,
RD
Re: Fw: Analysis for UIC Rad Waste

Re: Fw: Analysis for UIC Rad Waste

Wendy Cheung to: Robert Duraski 12/03/2009 09:01 AM

Bob,

I'm back. I was wondering if you also have recommended sampling methods for isotopes? The U, Ra, gross alpha and gross beta have MCLs so their methods are readily available, but not sure about K-40 and Th-230? I found this and got lost: http://www.epa.gov/waterscience/methods/ and thought I should just ask the expert. Thanks AGAIN!

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

Robert Duraski No Problem. I like your questions, most people d... 12/01/2009 11:02:24 AM

From: Robert Duraski/R8/USEPA/US
To: Wendy Cheung/R8/USEPA/US@EPA
Date: 12/01/2009 11:02 AM
Subject: Re: Fw: Analysis for UIC Rad Waste

No Problem. I like your questions, most people don't want to understand the radiation issues out of fear. Besides, this is the first time I have applied Appendix B in this way so I'm enjoying it. I usually use this appendix to calculate worker exposures on Superfund sites.

Re: Fw: Analysis for UIC Rad Waste

Re: Fw: Analysis for UIC Rad Waste

Wendy Cheung to: Robert Duraski 12/01/2009 10:16 AM

Bob,

Thanks for the response and corrections! I think I've got it now.

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

Robert Duraski Hi Wendy, The first statement is correct with the... 12/01/2009 09:57:29 AM

Fw: Analysis for UIC Rad Waste

Fw: Analysis for UIC Rad Waste

Wendy Cheung to: Robert Duraski 12/01/2009 07:35 AM

Bob,

Please ignore my previous email and let me correct my question. So we will sample for Ra-228 and K-40, subtract this from measured gross beta and see if it exceeds Pb-210 which has a limit of 10 pCi/L. For gross alpha, we sample for U-239,U-234, Thorium-230 and Ra-226, subtract these from measured gross alpha and compare to the limit of Ra-224 which is 200 pCi/L (Ra-224 is not on the table, but I went to the table and found the threshold limit).

Then we use the unity rule: divide all 10 isotopes by their 10CFR20 concentration limits and sum them up. If 1 is exceeded, the fluid is radioactive, otherwise not radioactive.

Would you mind reviewing the statement below for accuracy of message:
Found in 40 CFR 144.3, the UIC definition of radioactive waste is any waste which contains radioactive material in concentrations which exceed those listed in 10 CFR part 20, appendix B, table II, column 2. The concentrations referenced are protective dose limits for individual members of the public that the Nuclear Regulatory Commission has set. These concentration limits for liquid effluents when released to the general environment is equivalent to the radionuclide concentrations which, if inhaled or ingested continuously over the course of a year, would produce a total effective dose equivalent of 50 mrem. To put this into perspective, according to the National Council on Radiation Protection (1987), the average radiation dose to an individual in the United States is about 360 mrem/yr. On average, 80 percent of that exposure comes from natural sources including cosmic radiation (30 mrem/yr); terrestrial radiation from natural radioactive materials in rocks, soil, and minerals (230 mrem/yr); and radiation inhaled or ingested from food and water (40 mrem/yr).

Thanks again,

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

Wendy Cheung Bob, Quick clarification question, I think. 10CFR... 11/30/2009 05:47:38 PM

From: Wendy Cheung/R8/USEPA/US
To: Robert Duraski/R8/USEPA/US@EPA
Date: 11/30/2009 05:47 PM
Subject: Re: Analysis for UIC Rad Waste

Bob,

Quick clarification question, I think. 10CFR20, does not include values for Gross Alpha and Beta, so your using Pb-210 and Ra-224 as surrogates, but I don't see Ra-224 as an isotope to analyze for. Should this be Ra-226 or Ra-228? Thanks,

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

Robert Duraski Hi All, 11/16/2009 09:58:09 PM

From: Robert Duraski/R8/USEPA/US
To: Wendy Cheung/R8/USEPA/US@EPA, Chuck Tinsley/P2/R8/USEPA/US@EPA
Cc: Angelique Diaz/R8/USEPA/US@EPA
Date: 11/16/2009 09:58 PM
Subject: Analysis for UIC Rad Waste

Hi All,
Here is the corrected table.

[attachment "UIC Rad Limits.xls" deleted by Wendy Cheung/R8/USEPA/US]

Isotope	10 CFR 20 Apx B Table 2 Col 2 Standard		Method of Decay	Appendix B Note	Half Life	Not Listed Standard		Analyze For
	uCi/ml	pCi/l				uCi/ml	pCi/l	
Uranium Nat	3.0E-07	300						
Uranium-238	**3.0E-07**	**300**	**alpha**					**YES**
Thorium-234	5.0E-06	5000	beta					
Protactinium-234	3.0E-05	30000	beta					
Uranium-234	**3.0E-07**	**300**	**alpha**					**YES**
Thorium-230	**1.0E-07**	**100**	**alpha**					**YES**
Radium-226	**6.0E-08**	**60**	**alpha**					**YES**
Radon-222	Listed But No Standard							
Polonium-218	Not Listed		alpha	2	3.05 min	2.00E-09	2	
Lead-214	1.0E-04	100000	beta					
Bismuth-214	3.0E-04	300000	beta	2				
Polonium-214	Not Listed		alpha		1.5E-4 Sec			
Lead-210	1.0E-08	10	beta					
Bismuth-210 (m?)	8.0E-07	800	beta		5 Days			
Polonium-210	4.0E-08	40	alpha					
Lead-206 (Stable)								
Not Listed, No alpha or Fission Decay (beta decay)						**1.00E-08**	**10**	**YES**
Not Listed, alpha or Fission Decay						**2.00E-09**	**2**	**YES**
Radium-228	**6.0E-08**	**60**	**beta**					**YES**
Potassium-40	**4.0E-06**	**4000**	**beta**		**1.28E+09**			**YES**

Gross beta not accounted for should be consitered Pb-210
Gross alpha not accounted for should be consitered Ra-224

For K-40, multiply elemental K concentration in mg/l by 0.82 to determine the K-40 activity

RE: NHPA and ESA
Pat Obrien to: Wendy Cheung 12/02/2009 10:51 AM

Wendy,

Much of the permit area was and still is farmland. I know that corn is usually the crop grown in the area, but other crops may have been planted in the past. ECCV's water treatment plant shown on page 5 of the application is not yet constructed. It should be constructed by 2011. I know of two homes in the permitted area. I am not sure of the age of these structures, but I would estimate them to be about 30 years old. Our injection wells will not affect either of these structures.

The ditches in the AOR generally flow off for a few weeks and on for a few weeks from about March through October. During the winter, they may flow for brief periods, but nothing substantial.

I believe the rest of your statement below is accurate with the possible exception of the shallow ponds. I know from site inspections that there are no ponds in section 1. The pond shown on the map in the NW 1/4 of section 12 is actually not a pond but is a depression. I will inspect this area today and see if there is water in this depression.

Patrick

ESA/NHPA

-----Original Message-----
From: Cheung.Wendy@epamail.epa.gov [mailto:Cheung.Wendy@epamail.epa.gov]
Sent: Tuesday, December 01, 2009 4:10 PM
To: Pat Obrien
Subject: NHPA and ESA

Pat,

Can you review the statements below for veracity (particularly bold)? I went on googlemap to see what the site looks like. It looks like it was a cornfield and the water treatment plant hadn't been built, see picture below. You had said that here were a couple of structures within the area of review? Are the ditches ephemeral? If there's anything else you think should be added please let me know. Thanks, Wendy

As shown on the attached map [this is the map on page 5 from the permit application], the site and immediate vicinity includes an existing water treatment plant, and a number of drinking water supply wells, as well as oil and gas wells. To the north is the Lochbuie community, and to the south, there is a business park. There are a couple of residential homes within the area permit boundary that are older, but the exact age is unknown and no buildings will be abandoned as a result of this project. The new wells are sited in areas where wells have already been drilled and encroachment on large tracts of undisturbed land is unlikely.

In summary, the wells that will be drilled are located in a tract of land where other water and oil and gas wells already exist. If they exist at all, it is unlikely that there will be significant disturbances to historic structures, or any other type of structures. Please confirm the absence of historic structures within the permit area boundary and immediate vicinity.

Within the area permit, the attached map shows small bodies of water. Most of these water features have since disappeared. Any existing water features within the permit boundary have at most 1 foot deep.

(Embedded image moved to file: pic29554.gif)

Wendy Cheung

US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

ECCV permit
Pat Obrien
to:
Wendy Cheung
12/02/2009 03:25 PM
Show Details

Hi Wendy,

I made a site inspection of the site today, and there is (as of today) only one residence within the permitted area. The address of this frame structure is 21955 East 160th Avenue, Brighton, CO. According to Adams county Assessors records, it was constructed in 1957. Even though it is 52 years old, I don't think it has any historic value to anyone other than the owner.

The pond in the NW ¼ of section 12 on page 5 of the application is now a very wide storm drainage ditch. It has no free standing water in it and it looks like it would only flow in response to a significant precipitation event. So, it appears to me that there are no surface water features (streams, ponds, etc.) anywhere within the permitted area.

Also, Kipp is adding the last cement plug on the P and A form and should send it to you today.

Patrick OBrien

ESA /NHPA

Re: identification of endangered species habitat
Adam_Misztal to: Wendy Cheung 12/09/2009 02:46 PM

History: This message has been replied to.

Wendy,

It is highly unlikely that either Preble's or the orchid would be present at the project site. Therefore there would be no effect on any listed species.

Adam Misztal
Fish and Wildlife Biologist
USFWS, ES, Colorado Field Office
P. O. Box 25486, DFC (MS 65412)
Denver, CO 80225-0486
303-236-4753; Fax 303-236-4005
(134 Union Blvd., Suite 670)
(Lakewood, CO)

Cheung.Wendy@epamail.epa.gov

12/01/2009 04:48 PM

To: adam_misztal@fws.gov

cc:

Subject: identification of endangered species habitat

Adam,

I spoke to Susan today and she suggested I contact you to determine whether or not these species are located in the vicinity of the project that I am working on. The East Cherry Creek Water and Sanitation District is applying to the EPA for an area permit to drill three Underground Injection Control (UIC) wells to inject waste fluids associated with their reverse osmosis treatment plant. These injection wells are over 9000' deep and their locations are shown in the attached map. Also delineated on this map are the pipelines associated with this project that will carry the wastewater from the water treatment plant to the injection wells. The area permit can be described by a polygon with the legal description of the corners starting from the northeast corner and going clockwise:

190 feet from north section line, 650feet from west section line, S6, T1S, R65W
1080 feet from north section line, 1510 feet from west section line, S12, T1S, R66W
2180 feet from north section line, 1510 feet from west section line, S12, T1S, R66W
2180 feet from north section line, 0 feet from west section line, S12, T1S, R66W
2900 feet from north section line, 775 feet from east section line, S11, T1S, R66W
2690 feet from north section line, 960 feet from east section line, S11,

T1S, R66W
1890 feet from north section line, 0 feet from east section line, S11,
T1S, R66W
640 feet from south section line, 0 feet from west section line, S1,
T1S, R66W
190 feet from north section line, 0 feet from east section line, S1,
T1S, R66W

My understanding is that within the area permit boundary, the small bodies of water shown have since disappeared. Any existing water features within the permit boundary have at most 1 foot deep and would be unlikely to support wildlife.

Susan indicated that most likely these two species may be of concern and that you have locational information of their habitat.
Preble's Meadow Jumping Mouse and Ute ladies'-tresses orchid

Could you provide me with this information and information of any other species I should be concerned about? I found the county list for Adams County and it appears that there are 8 T or E species.

Thanks for you help,

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084
----- Forwarded by Wendy Cheung/R8/USEPA/US on 12/01/2009 04:27 PM -----

From:

Mail R8Printer/R8/USEPA/US@EPA

To:

Wendy Cheung/R8/USEPA/US@EPA

Date:

12/01/2009 03:37 PM

Subject:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
1595 Wynkoop Street
DENVER, CO 80202-1129
Phone 800-227-8917
http://www.epa.gov/region08

Edward C. Nichols
State Historic Preservation Officer
Colorado History Museum
1300 Broadway
Denver, CO 80203

RE: Underground Injection Control (UIC)
Class I Injection Well Area Permit

Dear Mr. Nichols,

The East Cherry Creek Water and Sanitation District is applying to the U.S. Environmental Protection Agency (EPA) for an area permit to drill three Underground Injection Control (UIC) wells to inject waste fluids associated with their reverse osmosis treatment plant. I am writing to request information on whether or not historic sites exist within the permit area and near vicinity.

These injection wells are over 9000' deep and their locations are shown in the attached map. Also delineated on this map are the pipelines associated with this project that will carry the wastewater from the water treatment plant to the injection wells. The area permit can be described by a polygon with the legal description of the corners starting from the northeast corner and going clockwise:
190 feet from north section line, 650feet from west section line, S6, T1S, R65W
1080 feet from north section line, 1510 feet from west section line, S12, T1S, R66W
2180 feet from north section line, 1510 feet from west section line, S12, T1S, R66W
2180 feet from north section line, 0 feet from west section line, S12, T1S, R66W
2900 feet from north section line, 775 feet from east section line, S11, T1S, R66W
2690 feet from north section line, 960 feet from east section line, S11, T1S, R66W
1890 feet from north section line, 0 feet from east section line, S11, T1S, R66W
640 feet from south section line, 0 feet from west section line, S1, T1S, R66W
190 feet from north section line, 0 feet from east section line, S1, T1S, R66W

As shown on the attached map, the site and immediate vicinity includes an existing water treatment plant, and a number of drinking water supply wells, as well as oil and gas wells. To the north is the Lochbuie community and one additional residential home does exist within the area permit, as well. The address of this frame structure is 21955 East 160th Avenue, Brighton, CO. According to Adams county Assessors records, it was constructed in 1957 and not believe

to be of historic significance. The area is already well traveled to perform maintenance on the existing wells and encroachment on large tracts of undisturbed land is unlikely.

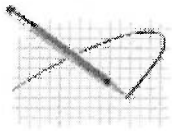
In summary, the wells that will be drilled are located on a tract of land where other water and oil and gas wells already exist. It is unlikely that there will be significant disturbances to historic structures, if they exist at all, or any other type of structures. Please confirm the absence of historic structures within the permit area boundary and immediate vicinity.

If you have any questions please contact me at (303) 312-6242.

Sincerely,

Wendy Cheung
UIC, Environmental Engineer

signed & dated
copy sent Dec 3, 2009



Tom Aalto/R8/USEPA/US
08/19/2009 02:28 PM

To Wendy Cheung/R8/USEPA/US@EPA
cc
bcc
Subject Re: Fw: Metals and voc's for ECCV Class I injection well application

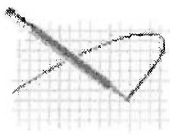
Hi Wendy,

These are all below the hazardous waste TC levels in 40 CFR 261.24

Please let me know if you have any other questions.

Tom

Wendy Cheung/R8/USEPA/US



Wendy Cheung/R8/USEPA/US
08/19/2009 02:04 PM

To Tom Aalto/R8/USEPA/US@EPA
cc
Subject Fw: Metals and voc's for ECCV Class I injection well application

Sorry about that Tom, must have accidently hit the forward w/o attachment.

The site is the East Cherry Creek Water and Sanitation District. It's located in Adams County in Section 1, Township 1S, Range 66W. It's just south of the Lochbuie, off of Hwy 76.

Thanks,

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

-----Forwarded by Wendy Cheung/R8/USEPA/US on 08/19/2009 01:59PM -----

To: Wendy Cheung/R8/USEPA/US@EPA
From: "Pat Obrien" <pwob@comcast.net>
Date: 08/19/2009 11:36AM
cc: "'Kipp Scott'" <kscott@eccv.org>
Subject: Metals and voc's for ECCV Class I injection well application

Wendy,

As you requested, I am providing a summary of the metals data you requested. The testing was done on water from the six existing production wells in 2005 and 2006. The metals data obtained at that time was actually total metals, not dissolved. This water will be run through a reverse osmosis system and the waste stream will be injected in to the injection well(s). We also have provided an estimate of the concentrations of the metals likely to be present in the injectate water (RO stream).

For your convenience, we have also attached the VOC results from the same sample sets.

Any question, please call.

Patrick OBrien

ECCV metals-voc summary for EPA.xls

RE: DI-1 Step test
pat obrien to: Wendy Cheung 08/24/2010 04:26 PM

Thanks much.
POB

-----Original Message-----
From: Cheung.Wendy@epamail.epa.gov [mailto:Cheung.Wendy@epamail.epa.gov]
Sent: Tuesday, August 24, 2010 4:09 PM
To: pat obrien
Subject: RE: DI-1 Step test

Testing the Wolfcamp separately is not a problem. If we gain more information, that's generally fine, it's when we lose information, then we need to be able to justify the change. In the case of sampling, Council and Amazon, given that the lithologies are very similar, it's reasonable that the TDS is similar as well.

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

From: "pat obrien" <pwob@comcast.net>
To: Wendy Cheung/R8/USEPA/US@EPA
Date: 08/24/2010 09:36 AM
Subject: RE: DI-1 Step test

One thing I can see coming that is not as specified in the permit. Originally, we planned to step test the Council Grove, Amazon and Wolfcamp
together as one unit. But because we are sampling/testing the Council Grove
and Amazon together (per our previous emails), the Wolfcamp will be left by
itself untested. So, we propose to sample/test the Wolfcamp by itself. I
know it is an extra step test, but this way we won't have to drill out the
bottom plug at the base of the Wolfcamp early.

POB

-----Original Message-----
From: Cheung.Wendy@epamail.epa.gov [mailto:Cheung.Wendy@epamail.epa.gov]

Sent: Tuesday, August 24, 2010 9:22 AM
To: pat obrien
Subject: Re: DI-1 Step test

Pat,

Please send in one final report, unless you feel that the results will affect your next step, feel free to let me know in advance.

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW

1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

From: "pat obrien" <pwob@comcast.net>
To: Wendy Cheung/R8/USEPA/US@EPA
Date: 08/24/2010 08:56 AM
Subject: DI-1 Step test

Wendy,

We completed the first step test on the Missourian formation yesterday. Turns out it took 336 gpm as 2840 psi., much better than I expected. We estimate the next step test (Council Grove/Amazon) will be on about the 27th or 28th. The following tests should be about 5 days apart thereafter.

Would you like the data from these tests as well as the water quality sample data sent to you as we complete each one, or in a final report at the end?

Patrick OBrien

Re: FW: ECCV DI 1
Wendy Cheung to: pat obrien 09/09/2010 04:28 PM

Pat,

I apologize for the late response on this. My review of the CBL showed good cement and will not require a RATS. My only concern was the calibration of the tool. You have provided plausible explanation below for the higher readings.

Wendy Cheung
US EPA Region 8
Mailcode: 8P-W-GW
1595 Wynkoop Street
Denver, CO 80202-1129
work: (303) 312-6242
fax: (303) 312-7084

"pat obrien" Wendy, 09/02/2010 03:20:05 PM

From: "pat obrien" <pwob@comcast.net>
To: Wendy Cheung/R8/USEPA/US@EPA
Cc: "Kipp Scott" <kscott@eccv.org>
Date: 09/02/2010 03:20 PM
Subject: FW: ECCV DI 1

Wendy,

I met with Brady Dilka who is an expert in logging procedures and interpretation. He ran the CBL log on the DI-1 well. I specifically asked him why there are high mv levels in the area above 450 feet and in the 2-3 foot zone near 9660 to 9670 feet. I also asked him about the tool calibration. His responses are below.

The crews are increasing their efficiencies and I think the work string will be out of the hole on about 9-8. It would be helpful if you could make the CBL analysis by 9-8, so if we need to do additional work (e.g. RATS test) we can use the on site rig.

If you could give us your opinion of the cbl log by then, when the rig is still on site, it would help us save some time and cost.

I also have uncovered some addition information regarding how others in the industry evaluate cbl logs (tracs international). It is different than that shown in the EPA guidance documents. You may be able to find it on the net in a search, but it is hard to print out. If you like I could send to you.

Patrick OBrien

From: bdilka@jwoperating.com [mailto:bdilka@jwoperating.com]
Sent: Thursday, September 02, 2010 2:36 PM
To: pwob@comcast.net
Subject: ECCV DI 1

From 450' to TOH we were dealing with fluid that had air in because we were loading the hole.

From 9660'-9670' the tool was reading higher formation values.

Also I would like to mention that we calibrated the tool in the section of the hole that we thought the pipe to be the most free. I can say from personal experience that is one of, if not the best, cement bond log that I have ever seen at this depth under these circumstances. I understand that zone isolation is key in this operation and believe that there are no issues with said concern.

Thank You

Brady

Brady Dilka

District Manager
1760 WCR 27 BLDG A/B
Brighton, CO 80603
C(970)520-7514
O(303)637-9751
F(303)637-9754

OFFICE *of* ARCHAEOLOGY *and* HISTORIC PRESERVATION

December 24, 2009

Wendy Cheung
UIC, Environmental Engineer
US Environmental Protection Agency
Region 8
1595 Wynkoop Street
Denver, CO 80202-1129

Re: Underground Injection Control (UIC) Class I Injection Well Area Permit (CHS #56106)

Dear Ms. Cheung:

Thank you for your recent correspondence dated December 3, 2009 (received by our office on December 7, 2009; additional information received December 23, 2009) and the documentation regarding the subject project.

Based on the nature of the proposed project in addition to previous disturbance in the area of the proposed activities, it is our opinion that no historic properties will be affected and the project may proceed without additional cultural resources inventory.

If previously unidentified archaeological resources are discovered in the course of the project, work must be interrupted until the resources are properly evaluated in terms of the National Register of Historic Places eligibility criteria (36 CFR 60.4) in consultation with our office.

Thank you for the opportunity to comment. If we may be of further assistance, please contact Shina duVall, Section 106 Compliance Manager, at (303) 866-4674 or shina.duvall@chs.state.co.us.

Sincerely,

Edward C. Nichols
State Historic Preservation Officer
ECN/SAD

COLORADO HISTORICAL SOCIETY
1300 BROADWAY DENVER COLORADO 80203 TEL 303/866-3395 FAX 303/866-2711 *www.coloradohistory-oahp.org*

Re: ECCV Class I public notice

Douglas Minter to: Pat Obrien, June Carnal 07/16/2009 11:56 AM
Cc: Wendy Cheung

Thank you Pat - this satisfies the 40 CFR Part 147.305(f) requirements I referred to earlier.

June - please proceed with our letter notifying Mr. Obrien that this Class I permit application is now administratively complete.

Thanks,

Douglas Minter, MPH
UIC Team Leader
(303) 312-6079
USEPA Region 8
1595 Wynkoop Street
Denver, CO 80202-1129
"Pat Obrien" <pwob@comcast.net>

"Pat Obrien" <pwob@comcast.net>
07/16/2009 10:02 AM

To Douglas Minter/R8/USEPA/US@EPA
cc
Subject ECCV Class I public notice

Doug,

Attached is the final public notice for the ECCV project. I made the changes you requested and, if it is acceptable to you, I will publish it as soon as possible.

Patrick OBrien ECCV Public Notice Deep injection wells.doc

Public Notice July 15, 2009

As a regional water provider, the East Cherry Creek Valley Water and Sanitation District (6201 S. Gun Club Road, Aurora, CO 80016) is committed to the communities of Colorado, and to the preservation of the environment.

We are providing notice that ECCV is applying for a permit to construct one to three Class I, deep injection wells in sections 1, 11, and 12, of T1S, R66W. The wells will be drilled to a depth of about 2 miles, which is about 1.5 miles deeper than any drinking water source. This area is in Adams County east of Highway I-76 and is between Bromley Lane and County Road 2. These wells are proposed to be constructed over the next several years.

The purpose of these wells is to dispose of process water resulting from ECCV's future water treatment facility located east of I-76 and north of Bromley Lane. Our intent is to inject into deep underground formation a volume of non-hazardous salty (saline) water. The process water contains the minerals and compounds that are naturally found already in this region's water; however, they are concentrated because of the water treatment process. This water will contain a total dissolved solids level that may range from about 4,700 to 24,000 milligrams per liter.

ECCV's local water wells currently draw water from depths of around 70 feet. Comparatively, the saline water will be injected to far deeper levels, into underground formations that lie about 9,300 to 10,400 feet below ground level, kept safely from any drinking water sources in the area. The geologic injection zones include, in descending order, the Lyons, Wolfcamp, Amazon, Council Grove, Admire, Virgil, and Missourian Formations. These are all non-drinking water formations in the area. Total dissolved solids levels in these formations are typically between 12,400 and 38,600 milligrams per liter. Records from the Colorado Oil and Gas Conservation Commission indicate there are approximately 47 deep injection wells that have been injecting and/or are currently injecting salty oil well-related production water into these and other deep formations in Adams and Weld Counties.

It is extremely important to ECCV and the U.S. Environmental Protection Agency that the injection wells are operated safely and that the injected water does not contaminate any drinking water aquifers. ECCV will operate the wells under an EPA approved permit which requires a monitoring plan and reporting in place to assure proper operation. This plan includes inspecting the system regularly and long-term mechanical well integrity testing. In fact, this letter is a requirement of the EPA notification process. There are three drinking water aquifers in the area including the stream-deposited sand/gravel with depths of 30 to 90 feet and the Arapahoe and Laramie-Fox Hills at depths of 400 to 1,200 feet. There are two barriers that will prevent the injected water from migrating toward the drinking water aquifers. The first is a natural barrier, the Pierre Shale, which is approximately 6,000 feet thick. This shale is of very low permeability and will prevent upward flow to the drinking water aquifers. Also, each injection well will be cemented off from ground level to a depth of about 9,300 feet. This cement will provide further protection to insure the injected water will not be able to seep into the drinking water aquifers.

The injection rates for each well will range up to 150 to 400 gallons per minute at certain times of the year. Injection pressures will like range from 2,000 to 3,000 pounds per square inch.

Also, as part of the permit approval process, there will be an opportunity for public comment.

We will provide you with more information as the plans are firmed up and ready for publication. Please direct any questions to Ms. Wendy Cheung, EPA, 303-312-6242 (cheung.wendy@epa.gov.) or to Patrick OBrien/Scott Mefford, Hydrokinetics, at hydrokinetics@comcast.net.